Supplementary materials

Table A. Pair-wise PERMANOVA comparisons for aggregate roving predator populations and select species. Monte Carlo values presented when the number of permutations are < 50.

All Roving Predators (Pooled)				
MHI, Depth	t	P(perm)	No. Perms	P(MC)
0-30 vs 30-53 m	1.1853	0.2452	9947	-
0-30 vs 53-100 m	1.3096	0.1319	9956	-
30-53 vs 53-100 m	1.6025	**0.0267**	9953	-
NWHI, Depth				
0-30 vs 30-53 m	1.5141	0.0633	9948	-
0-30 vs 53-100 m	3.1668	**0.0001**	9950	-
30-53 vs 53-100 m	1.8725	**0.0018**	9945	-
MHI, NWHI				
0-30 m	4.3437	**0.0001**	9954	-
30-53 m	1.3728	0.1175	9953	-
53-100 m	2.4939	**0.0001**	9939	-
MHI, Depth, Habitat				
0-30 m, Hard vs unconsolidated	1.3760	0.1421	108	-
30-53 m, Hard vs unconsolidated	0.5526	0.8134	4725	-
53-100 m, Hard vs unconsolidated	1.4682	**0.05**	9900	-
NWHI, Depth, Habitat				
0-30 m, Hard vs unconsolidated	-	-	-	-
30-53 m, Hard vs unconsolidated	1.7225	**0.0163**	1346	-
53-100 m, Hard vs unconsolidated	0.9037	0.569	9090	-
MHI, NWHI, Hard-bottom				
0-30 m	4.3773	**0.0001**	9963	-
30-53 m	3.2704	**0.0001**	9955	-
53-100 m	1.8523	**0.0043**	9936	-
MHI, NWHI, Unconsolidated				
0-30 m	-	-	-	-
30-53 m	0.6636	0.7918	41	0.6699
53-100 m	1.9719	**0.0019**	7557	-
MHI, Depth, Hard-bottom				
0-30 vs 30-53 m	1.6720	**0.0493**	9944	-
0-30 vs 53-100 m	2.6502	**0.0006**	9235	-
30-53 vs 53-100 m	1.2381	0.1973	9878	-
MHI, Depth, Unconsolidated				
0-30 vs 30-53 m	0.9830	0.3363	16	0.4279
0-30 vs 53-100 m	0.8573	0.5809	140	-
30-53 vs 53-100 m	1.4154	0.0608	5021	-
NWHI Depth, Hard-bottom				
0-30 vs 30-53 m	1.5115	0.0645	9951	-
0-30 vs 53-100 m	3.2694	**0.0001**	9954	-
30-53 vs 53-100 m	2.6736	**0.0001**	9953	-
NWHI Depth, Unconsolidated				
0-30 vs 30-53 m	-	-	-	-
0-30 vs 53-100 m	-	-	-	-
30-53 vs 53-100 m	1.2773	0.134	63	

Carangoides orthogrammus				
MHI, Depth	t	P(perm)	No. Perms	P(MC)
0-30 vs 30-53 m	2.7649	**0.0079**	34	**0.0082**
0-30 vs 53-100 m	1.7491	0.095	42	0.0797
30-53 vs 53-100 m	0.7986	0.4744	83	-
NWHI, Depth				
0-30 vs 30-53 m	1.7091	0.1049	30	0.0964
MHI, NWHI				
0-30 m	0.3961	0.9414	9	0.6955
30-53 m	0.2772	0.8126	107	-
Caranx ignobilis				
MHI, Depth				
30-53 vs 53-100 m	0.4535	0.761	16	0.6432
NWHI, Depth				
0-30 vs. 30-53 m	1.1716	0.252	805	-
MHI, NWHI				
30-53 m	2.2566	**0.0389**	38	**0.0303**
*Seriola sp**				
MHI, Depth				
0-30 vs 30-53 m	0.1154	1	4	0.9246
0-30 vs 53-100 m	1.6798	0.1426	24	0.0972
30-53 vs 53-100 m	1.4419	0.1728	20	0.149
NWHI, Depth				
0-30 vs 30-53 m	1.5207	0.1681	30	0.1315
0-30 vs 53-100 m	4.0926	**0.0003**	1065	-
30-53 vs 53-100 m	2.4797	**0.0128**	1807	-
MHI, NWHI	`			
0-30 m	0.8547	0.5541	6	0.4024
30-53 m	2.2232	0.0575	20	**0.0307**
53-100 m	3.9797	**0.0002**	1908	-
Pseudocaranx cheilio				
NWHI, Depth				
30-53, 53-100 m	1.5644	0.1001	60	-
Carcharhinus plumbeus				
MHI, NWHI				
53-100 m	0.2718	0.832	23	0.798
Triaenodon obesus				
NWHI, Depth				
0-30 vs 30-53 m	0.5550	0.5702	96	-
0-30 vs 53-100 m	3.2475	**0.0028**	22	**0.002**
30-53 vs 53-100 m	3.2726	**0.0021**	42	**0.0022**

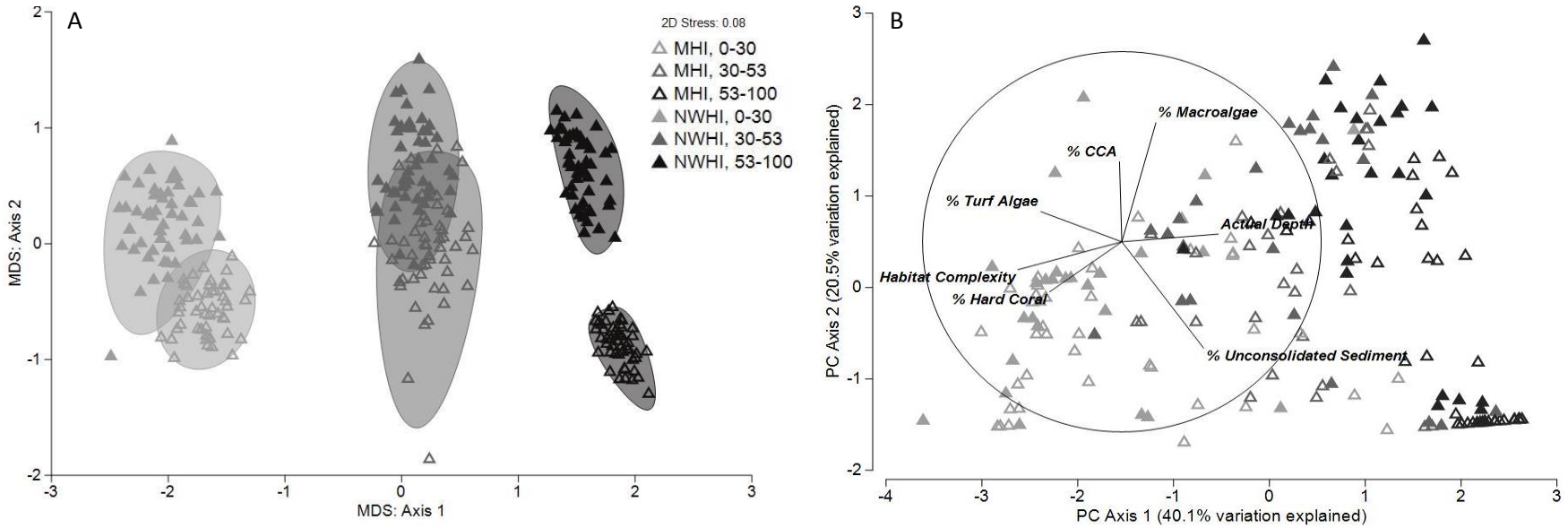

Figure A. Bootstrap resampling, 50 bootstraps per group. Normalized environmental data, transformed into a Euclidean distance matrix Region (MHI, NWHI) x Depth Strata (shallow; upper and lower mesophotic), plotted mMDS. Shaded bootstrap regions, which represent measurements of centroid error: 95% confidence intervals, averages based on m = 4 dimensional metric MDS (rho = 0.994). B.) Environmental variables were normalized, and plotted with individual samples representing sites binned into regional (MHI, NWHI) and depth groups (shallow water; upper and lower mesophotic). Correlations of habitat variables are specified by vector direction and length. Open diamonds represent MHI sites, closed diamonds represent NWHI sites. Light grey = shallow (0 – 30 m), medium grey = upper mesophotic (30 – 50 m), dark grey = lower mesophotic (53 – 100 m).

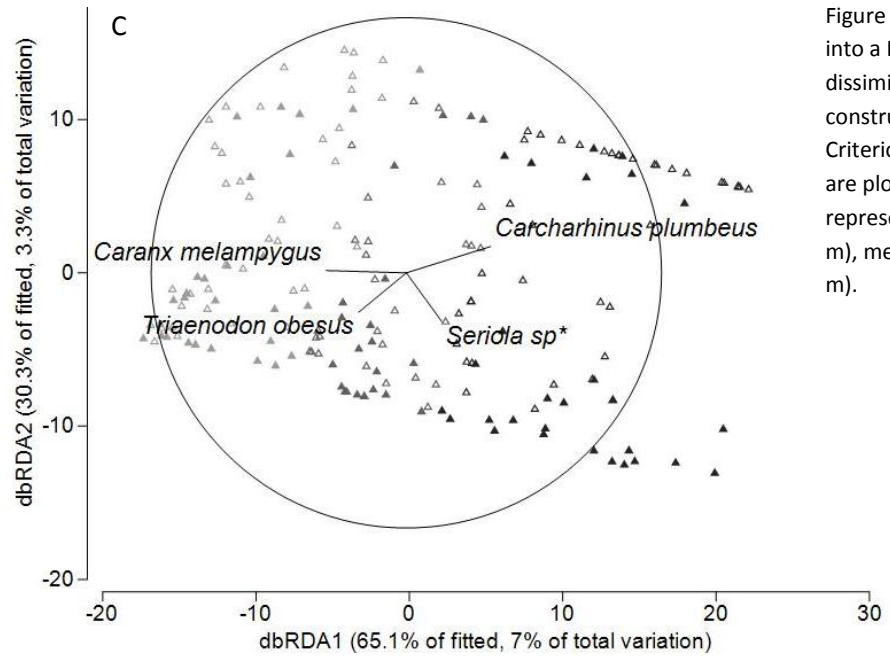

Figure C. dbRDA plot of environmental data that has been normalized and transformed into a Euclidean, distance-based matrix and the square root, zero-adjusted Bray Curtis dissimilarity mobile predator abundance matrix. Parsimonious (optimal) model construction used for the input DISTLM incorporated a modified Akaike's Information Criterion (AICc) and BEST procedure. Vectors of species with a Pearson's correlation > 0.2 are plotted, with length and direction of vector indicating strength. Open diamonds represent MHI sites, closed diamonds represent NWHI sites. Light grey = shallow (0 – 30 m), medium grey = upper mesophotic (30 – 50 m), dark grey = lower mesophotic (53 – 100 m).

Environmental habitat variables were similar between the MHI and NWHI in shallow water and upper mesophotic strata (Figure A) as evidenced by the overlap in 95% confidence interval ellipses, while variable separation in the lower mesophotic zones was attributed to regional asymmetric sampling of substrate types (number of hard-bottom versus unconsolidated sediment sites).

The PCA, which assesses covariance along benthic functional groups for all pooled survey sites, explained over 60% of the variation along the first two principal components. Coral cover, habitat complexity, and turf algae were aligned along the first principal axis and tended to be higher in shallow water (Figure B), coinciding with shifts from aggregate reef, spur-and-groove, and boulder habitats to lower lying aggregate and patch reefs, rubble flats, or sand flats as depth increased. Macroalgae and crustose coralline algae cover were aligned with the second principal component and largely driven by previously described changes in sampled habitats when moving from shallow to mesophotic depths, along with shifts in increased unconsolidated sediment percent cover.

While 95.1% of the fitted DistLM model was explained along the first two axes, only 10.3% of the total variation could be explained with % hard coral, actual depth, and % unconsolidated sediment identified by the relationships between dbRDA coordinate axes and orthonormal X variables and four species (*Caranx melampygus*, *Triaenodon obesus*, *Carcharhinus plumbeus*, and *Seriola sp.;* Figure C) being weakly correlated (Pearson correlation > 0.2), with assemblage vectors indicative of strength and direction.